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PRS

A SEMI-AUTOMATED RESEARCH BASED APPROACH
IN THE MANAGEMENT OF HUMAN RESOURCES

U.S. DEPT. OF AGRICULTURE
OFFICE OF PERSONNEL

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George W. Mayeske
and
Albert S. Glickman

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MANAGEMENT OF HUMAN RESOURCES

George W. Mayeske

and

Albert S. Glickman

Personnel Research Staff

Office of Personnel

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SUMMARY

The fundamental objective of the program called MOHR (Management of Human Resources) is to improve the quality of decisions affecting the people who work for the Department of Agriculture and the management of the programs of the Department by making available more promptly, more and better information about people's skills, knowledge, performance and potential, and about the requirements of the jobs that need to be done.

This report outlines a conceptual model and proposed procedures to implement that objective for career occupational areas in USDA. Built into this model is sufficient flexibility to allow it to accommodate the differences in personnel administrative procedures in different agencies and for different occupations, both as they now exist and as they may change through research and administrative evolution.



Albert S. Glickman
Chief, Personnel Research Staff

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A SEMI-AUTOMATED RESEARCH BASED APPROACH IN THE
MANAGEMENT OF HUMAN RESOURCES

This is a brief review of some of the work that the Personnel Research Staff (PRS) has been engaged in for the past year, and an attempt to show where this work leads and how it shapes some of our conceptions regarding MOHR (the Management of Human Resources). It is hoped that this report will serve as a guide in the development of plans and programs for the different agencies and groups with whom PRS has been and will be engaged.

Specifically, this report will deal with some of the initial distinctions that were made between research and administration, how these distinctions have been developed in practice and how the products of personnel research soon become an integral part of the administrative process.

PRS's original approach conceived of research and administration as being separate but interdependent functions. Many of the things one would like to accomplish with a computerized management information system presuppose an established and ongoing personnel research program. As the initial research efforts begin to pay dividends, however, this distinction between research and administration will become less clear-cut. Thus, not only will the results of research form an integral part of the administrative process but much of the research will help to shape the nature of the management information system.

The general philosophy underlying this approach has been one of helping management improve its personnel decision-making ability by providing more and better information about the aptitudes, interests, potentialities and performance of its employees.

The DISC Procedure

Bearing in mind the initial distinction between research and administration, PRS first outlined a logical sequence of questions that might be asked concerning any occupational hierarchy or career development process. These steps which have been assigned the mnemonic DISC (Decision Information Simulating Careers) are listed in Exhibit 1.

Inspection of Exhibit 1 shows the administrative and research questions which can be outlined for an occupational group. The administrative questions focus on the kinds of information needed and the processes by which personnel decisions are made. The research questions focus on means of providing information for improving the various personnel decision processes.

The DISC procedure is best illustrated by an example given in Exhibit 2. This abbreviated DISC procedure was outlined for the Forester (General

Exhibit 1

DISC* PROCEDURE

A. Administrative

B. Research

Starting at the top of the occupational hierarchy and working on down to the entry level

1. What are the positions at each level?
 2. From what positions are these people recruited?
 3. What are the necessary prerequisites for candidacy?
I.e. What kinds of experience and education must these people have?
 4. What is the decision process by which these people are selected?
I.e. Who decides who shall be selected and what do they take into account in doing this?
 5. What kinds of information should be kept on these people in order to facilitate this decision process? How current must this information be?
2. Are there optimal positions from which to recruit?
 3. What is the relative importance of these prerequisites? Are there optimal experiences to maximize performance? (See 4 below)
 4. What are the critical requirements of the job? To what extent do these overlap with other jobs in the hierarchy? Are these requirements predictable from background data, test and performance scores?
 5. How do these categories of information change with time?

*Decision Information Simulating Careers

Service 460) occupational group by Forest Service personnel representatives. Similar DISC procedures have been or are being outlined for: Plant Quarantine Inspectors (GS 436); Soil Conservationists (GS 457); Accountants and Auditors (GS 510); Personnel people (GS 201, 212, 213, 221, 223, 230, 235) and Data Processors (GS 330, 331, 332, 334, 359, 362).

Exhibit 2 shows the application of this procedure to a specific occupational group. A full DISC procedure would require a very detailed outline and specification of what categories of information are involved in a particular decision and where these categories of information are recorded. Thus experience information may be available from a Standard Form 57 whereas appraisal information must be obtained from a different form or set of forms.

The remainder of this report will deal with the Critical Requirements and Experimental Testing Programs and will then integrate their results into the DISC procedure.

The Critical Requirements Research Program

One of the research questions in the DISC procedure inquires about the critical requirements of different occupations. Critical requirements are determined by analyzing and categorizing specific occurrences which contribute to effective and ineffective job performance. These specific occurrences, called critical incidents are collected from people actually engaged in the work. The areas or categories defined by the critical requirements are called performance areas. When these performance areas are listed in booklet form for a particular occupational group they then comprise a Performance Record. An example of part of a Performance Record developed for the Plant Quarantine Inspectors (GS 436) is given in Exhibit 3.

A Performance Record is a record that a supervisor keeps for each of his subordinates, making critical incident entries at the time that they occur. Studies have shown that a supervisor will spend about four or five minutes a day making these entries for a group of employees.² A Performance Record is the building block upon which a Personnel

¹Harmon, F. L. Performance Records: An Autoinstructional Introduction, 1963.

²Flanagan, J. C. & Burns, R. K. "The Employee Performance Record", pp. 262-271 in Whisler & Harper (Eds.) Performance Appraisal: Research and Practice, New York: Holt, Rhinehart & Winston, Inc., 1962.

FORESTER (GS 460) DISC PROCEDURE

ADMINISTRATIVE

RESEARCH

- | ADMINISTRATIVE | RESEARCH |
|--|--|
| 1. Summer student employees | 1. Evaluation of background and qualitative information on summer students

Have: 57 or short form
Some vouchers
Veterans preference
Appraisals |
| 2. Junior Forester (GS-5 or 7) (Entry into probation period
SF-57
GS level determined by class standing, experience, veterans preference
Vouchers
Physical exam | 2. Comparison of summer student employees who do and do not come into the FS in terms of background data, test scores, summer performance appraisal, etc.

A. Ascertain comparability of quality of input from different schools |
| 3. Junior Forester probationary period (12 months)
(GS-5 are in an accelerated training program for a minimum of 6 months which may or may not lead to a promotion to GS-7)
Establishment of minimum qualifications
(a) Catalog of candidates experiences
(cumulative)
Time beyond minimum spent marking ___ kind of timber(s)
Time beyond minimum spent scaling ___ kind of timber(s)
Recency of experiences (date of experience)
Awards and disciplinary action
Type and frequency of accidents
Other kinds of training, quality and quantity of speeches, inspections made and types
CSC performance appraisal (outstanding, satisfactory, unsatisfactory)
Decision to retain versus not retain | 3. Establish critical requirements beyond minima.
What goes into the retention decision and what are the predictors of this from background, test battery and performance scores? |

Exhibit 2 (Continued)

4. Of those retained, decision to promote versus not promote.	4. What goes into promotion decision?
End of Probationary Period	
<p>5. CSC performance appraisal (outstanding, satisfactory, unsatisfactory)</p> <p>6. Promotion(s) Appraisal Establishment of minima for promotions to different jobs Additional categories of experience Training--kind of course taken and by whom given Disciplinary action Individual awards Supervision Annual Update Accident rate of supervisees, etc. Frequency and nature of personal accidents Express desire to be considered for another career field and specialization of field(s)</p>	<p>6. Establishment of critical requirements beyond minima. Validation of current qualifications characteristics.</p>

Exhibit 3

Example of a Portion of a Plant Quarantine
Performance Record Form

*1. Knowledge of Policies, Procedures, and Methods of Inspection

<p>** A. Followed proper procedure under unusual circumstances; B. Expedited action on urgent shipment; C. Handled unusual export/import correctly; D. Corrected error with minimum damage to importer's goods or PQ reputation.</p>	<p>a. Did not inspect carrier or commodity properly; b. Did not know regulations; c. Did not follow established administrative procedure; d. Did not follow established policy or method for examination of interceptions.</p>
--	--

Date	Item	Specific Occurrence
------	------	---------------------

Date	Item	Specific Occurrence

11/6	a	Kicked and then released cars without inspection.
------	---	---

*2. Knowledge of Pests and Commodities.

<p>** A. Found significant pest on new post or from previously unknown habitat; B. Discovered quarantine important commodities or packing materials; C. Recognized need for special care in fumigation or treatment of commodity.</p>	<p>a. Did not recognize significant pest risk; b. Did not distinguish between prohibited or permitted commodities; c. Fumigated or treated commodity improperly.</p>
---	--

Date	Item	Specific Occurrence

8/19	A	Larvae on coffee berries from previous non-med fly country.
------	---	---

Date	Item	Specific Occurrence
------	------	---------------------

*Performance areas

**Critical requirements

***Critical incident entries

Performance Information System is erected. It is not a rating form, it is not a computer storage document, it is merely the record in which the supervisor makes entries. It serves as a basic information source for various administrative decisions and recommendations. Examples of these are promotion recommendations and training nominations.

Developing a Performance Profile

How then do we convert this Performance Record information into a form that can be utilized by our computerized management information system? To accomplish this the concept of a Performance Profile is introduced. The concept of a Performance Profile is most easily explained by going over the example in Exhibit 4 in accordance with these instructions.

1. Review employee's Performance Record for the last ____ months.
2. On the Performance Profile place an X in the space above the number of any performance area for which you feel that you should not provide an appraisal for this period because:
 - a. You have not had enough opportunity to observe his performance in this area.
 - b. His assignments during this period did not involve performance in this area.

Note: The absence of recorded incidents is not a sufficient basis for a decision not to appraise the employee's performance in an area. Since only critical incidents are recorded, it may be that you have had enough opportunity to observe, but none of the actions or behaviors that you observed was particularly effective or ineffective. Performance in that area would therefore most likely to be of the 'typical' kind.

Thus, in Exhibit 4, Mr. Sample's supervisor placed an X in Performance areas 1 and 5 indicating either that he did not have an opportunity to observe Mr. Sample's performance in these areas or that Mr. Sample's assignments did not involve performance in these areas.

3. Now review the remaining performance areas. In which one did he perform most effectively during this period? Write 1 in the space above the number of that category. In Exhibit 4, the second area, Knowledge of Pests and Commodities, was Mr. Sample's strongest Performance Area.
4. Think of a person who might be considered a 'model' of performance in this category. An example of a 'model' for area 2, Knowledge of Pests and Commodities, might be described as one who consistently performs the effective critical requirements

Exhibit 4

Hypothetical Performance Profiles on a Plant
Quarantine Inspector (GS 436)

Areas of Performance	Knowledge of policies, procedures & methods of inspection	Knowledge of pests & commodities	Accomplishing work assignments	Explaining prog., policy & actions	Assuming initiative & responsibility	Relationships with co-workers	Relationships w/other agencies, transp. cos., brokers & dock empls.	Relationships with the public
	1	2	3	4	5	6	7	8
Rank Order	<u>X</u>	<u>1</u>	<u>5</u>	<u>5</u>	<u>X</u>	<u>7</u>	<u>2</u>	<u>3</u>
Very much like	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Not at all like	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Soc. Sec. Number: 867 92 315

Name: Sample, E. K.

Period:
From 7-1-62
To 6-30-63

Occupational experience code: 0436-5

Ready for promotion to: 436-12-A

Supervisor's Name: Perior, S. U.

Soc. Sec. Number: 395 86 767

for this category. The effective critical requirements as they would appear in the Performance Record are given in Exhibit 3.

5. In the first area of performance you are considering, how does this employee compare with the model? Is the person being appraised by you just like the model? Is he not at all like the model? Or is he somewhere in between? If the person is very much like the model, blacken in one of the spaces toward the top of the column. However, if you feel that this person is not quite like the model blacken a lower space. Similarly, if the man is not at all like the model blacken one of the lowest squares. You can blacken a space any place in the column depending upon how much the person resembles the "model." In some cases, you may have difficulty finding the precise spot for the person. Use your best judgment.

Let us take the area ranked 1 in Exhibit 4 as an example. Mr. Sample's supervisor regarded his "knowledge of pests and commodities" as being very much like the model and so he marked a space near the top of column 2.

6. Among the performance areas now remaining, in which one did he perform most effectively during this period? Write 2 in the space above the number of that area, and follow steps 4 and 5 again, ending with a space blackened in that column. In Exhibit 4, Mr. Sample's second strongest area of performance was in his "relationships with other agencies, transportation companies, brokers and dock employees."
7. Following the same procedures, write 3 above the number of another performance area and blacken a space in that column. In Exhibit 4, "relationships with the public" was Mr. Sample's third strongest area of performance.
8. In which performance area did he perform least effectively during this period? Write 7 above that column and blacken a space.

Note: Since you are comparing an individual's performance in each area with his own performance in other areas, it does not necessarily mean that the performance in the area you have numbered 7 is ineffective or unsatisfactory; only that during this particular period it was this individual's least strong area of performance. How much less is indicated by the space in the column that you mark.

In Exhibit 4, "relationships with co-workers" was Mr. Sample's least strong area of performance.

9. Above each of the remaining columns write 5, and blacken a space in each column to show how the person compares with the "model" of performance in each case. Some of the "5" columns may be marked at the same level, if it is not possible to say that the level of performance is different in two or more areas of performance.

In Exhibit 4, these areas of performance for Mr. Sample were "accomplishing work assignments" and "explaining programs, policy and actions." The supervisor made an appraisal for these areas even though he might not have had any critical incident entries in the Performance Record for these areas. He did this because Mr. Sample's assignments did involve performance in these areas that he was able to observe during this period.

Since Performance Profile information has a very close connection with aspects of the Experimental Testing Program, the latter program will now be discussed and then tied in with Performance Profile information.

The Experimental Testing Program

Another research question in the DISC procedure asks about the predictability of certain personnel decisions from background information, test and performance scores. In order to ascertain the extent to which these kinds of information relate to personnel decisions, PRS in association with the personnel groups of the various agencies, initiated an Experimental Testing Program. This program is experimental in that we are "testing the tests" to see which ones relate to performance on the job. This is being done by administering the tests to people who are just entering various avenues of work. As these people progress in various occupations, the test results can be related to their success on the job, i.e. their Performance Profiles. Those tests that do predict success on the job, then can be used administratively as an aid in selecting and guiding new people into various kinds of work.

The two test batteries currently being administered experimentally are an Omnibus form and a Math/Science form. The Omnibus form is being administered to incoming junior professionals and professionals within three to six months after they enter on the job. The Math/Science form is a special edition for incoming Physicists, Engineers, Mathematicians, Mathematical Statisticians and Statisticians. A third form, Administrative-Supervisory, will be initiated at a later date.

Further, as these people are promoted to higher levels of work, their Performance Profiles from a lower occupational level can be related to their Performance Profiles at a higher level. To the extent

that a relationship is demonstrated, this information can then be added to the data available for use in estimating how well other people will do in a particular position.

Using the Information

An example of what this validated test and performance information might look like is given in Exhibit 5. We will explain it and describe some ways in which the system can be used in decision-making processes.

The left column in Exhibit 5 lists some examples of different tests and performance scores. The next four columns, between the wavy lines, list test identification numbers and three individual's social security numbers (SSN) and their test and performance scores. The wavy lines indicate that the test scores are stored on a different magnetic tape than the weighting systems.

The weights for estimating success in the different performance areas will be obtained from research that will have been completed with people who have previously held similar positions. The weights are different for different positions and areas of performance and there may be a hundred or more such weighting systems. A candidate's success probability score for performance area 1 in a GS 457-12 position is obtained by adding up his scores on Verbal Facility, Outdoor and Mechanical Interests and his performance in area 1 as a GS 457-11. Similarly, to obtain his estimated degree of success as a GS 457-12 in performance area 2, his Persuasive Interest score would be multiplied by 2 and would then be added to his Literary Interest score in performance area 2 as a GS 457-11.

The performance areas in Exhibit 5 would not be the same across all occupational groups. Thus performance area 1 for the 457 series might be very different from performance area 1 for the 460 series.

An individual's candidacy for a job is determined by his satisfying the minimum requirements for that job. Thus, to be a candidate for a GS 457-12 one must meet certain prescribed educational and experience requirements.

A Hypothetical Inquiry

Let us assume that an opening has occurred for a GS 457-11 Area Conservationist. To be a candidate for a 457-11 Area Conservationist an individual must have a college degree in: Soil Conservation; Range Conservation; Civil or Agricultural Engineering; Agronomy or Soil Science. In addition, he must have had experience in developing farm and ranch plans with other government units or agencies; demonstrated interest in self-improvement, willingness to accept greater responsibility, etc. These skill qualifications are described in the computer

Validated Test and Performance Information

Test Ident.	Individual Test Scores			Weights for Estimating Success in Different Performance Areas				
	SSN1 SSN2 SSN3			1	2	3	4	5
				457-12-1	457-12-2	460-12-2	460-12-1	436-12-1
1	20	22	25	1	0	0	3	0
2	6	4	5	0	0	0	0	0
3	20	12	15	0	0	0	1	0
4	58	60	62	1	0	4	-1	0
5	43	46	44	1	0	0	0	0
6	30	27	31	0	0	0	0	0
7	46	43	41	0	0	0	-1	0
8	29	34	30	0	2	0	-1	1
9	22	28	24	0	0	0	0	0
10	23	24	20	0	1	0	0	0
11	10	14	12	1	0	0	0	0
12	40	36	39	0	1	0	0	0
13	27	38	50	0	0	0	0	0
Perf. Area 1 GS 457-11								
Perf. Area 2 GS 457-11								
Perf. Area 3 GS 457-11								

Weighting procedure - Multiply each person's scores by the weights in the jobs for which he is a candidate* and convert to estimated degree of success score for each area of performance.

*Candidacy determined by selecting those who meet the minimal requirements for inquiry number _____.

system in terms of code numbers for these different categories of information. Thus a college major in Agronomy could be represented by an 04 and Soil Science by an 87. All of these experience categories would have similar type codes. An inquiry might specify these requirements in terms of the appropriate codes. These would be labeled the minimal requirements. This particular job opening however, might have some specific requirements such as the candidate being able to speak French since the opening is in the French speaking sector of Louisiana. This specific requirement would also be spelled out in terms of a particular code. The computer could then provide a list of people who fulfill these requirements.

Exhibit 6 lists the bare essentials of an output for such a hypothetical inquiry. The first row in Exhibit 6 lists the inquiry number, the GS level, series and experience code. Thus 04576 might designate Area Conservationist. A roster of six people was requested. Then a variety of identifying information is listed along with each candidate's Social Security Number and Name. These are his current grade, an organizational code, an occupational experience code and his success probabilities for the seven performance areas associated with a GS-11 Area Conservationist.

Thus the first candidate, Upson Downs is currently in a particular organization as a GS-9 working in the 04573 area which might designate Erosion Control.

His relative standing scores indicate the extent to which his predicted performance in each of the performance areas exceeds those of other candidates for those areas. Thus, he exceeds 9 out of 10 candidates for performance areas 1 and 7; 8 out of 10 for performance areas 3, 5 and 6; 7 out of 10 for performance area 4; and 6 out of 10 for performance area 2. These performance areas refer to Area Conservationist at the 11 level.

The reader will note that the output in Exhibit 6 is labeled Stage 3. This would represent a final stage of development for some of the occupational groups. The first stage designates the current administrative practices and forms converted to a computer system. Thus the output for a Promotion Analysis Summary at Stage 1 might entail the current Promotion Appraisal forms plus any other necessary information. A Stage 2 Promotion Analysis Summary would entail an output of each candidate's most recent Performance Profile. For many occupational groups Stage 2 will be the final stage since there are not sufficient numbers of people to develop predictive information, and informed judgments rather than empirical analyses will have to provide the weights assigned to the different categories of information.

Coding routines are being developed for the different skills and qualifications information that are currently kept on employees so

Exhibit 6

Promotion Analysis Summary

Inquiry Number 329		GS 11-04576		No. requested: 6		Stage 3					
Soc. Sec. No.	Name	Current Grade	Organizational Code	Current Occup. Exper. Code	Relative Standing for Performance Area Number						
					1	2	3	4	5	6	7
509 32 450	Downs, Upson	9	xxxxxxxxxxxx	04573	9	6	8	7	8	8	9
408 39 276	Kett, Eddy	9	xxxxxxxxxxxx	04573	7	8	6	9	6	9	8
907 36 258	Doe, Norman	9	xxxxxxxxxxxx	04571	5	6	8	7	9	9	8
893 48 763	McQueen, James	11	xxxxxxxxxxxx	04571	8	9	7	8	7	7	8
789 99 878	Mendel, Gregory	11	xxxxxxxxxxxx	04572	6	8	5	5	5	7	7
683 45 210	Bloom, Gene	9	xxxxxxxxxxxx	04574	9	9	8	9	9	6	5

that Stage 1 conversions might possibly begin during the forthcoming calendar year. When a particular occupational group is ready to convert to the computer however, they might be at Stage 2, viz. they may have Performance Profile information. As validity information on tests and performance becomes available Stage 3 implementations can then be made. The length of time required to reach Stage 3 for a particular occupational group will depend upon its size and the areas of performance that are of interest to the management people responsible for that occupational group.



